5. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

5.1 PRODUCTION

Natural gas and gases associated with crude oil contain varying amounts of hydrogen sulfide from trace amounts to 70–80%; gases containing hydrogen sulfide are referred to as sour gas (Pouliquen et al. 1989). Recovery of hydrogen sulfide from petroleum, natural gas, or manufactured gas operations is the main non-natural source of hydrogen sulfide. Recovery of hydrogen sulfide from petroleum, natural gas, and manufactured operations can be categorized into several methods. These include chemical and physical absorption, dry oxidation processes to form sulfur or oxides (Clause process), and liquid oxidation processes to form oxides (Ferrox process) (Beauchamp et al. 1984). Hydrogen sulfide can be produced by chemical reaction, reacting sulfur either with hydrogen gas (H_2) or with a hydrocarbon (Pouliquen et al. 1989). Another method of hydrogen sulfide recovery is hydrodesulfurization in which gas-oil and coke distillate fractions, which account for more than 90% of the sulfur in crude oil, are passed through a fixed-bed catalyst in the presence of hydrogen. Approximately 80–90% of the sulfur-containing compounds, mostly acyclic and cyclic sulfides, are converted into hydrogen sulfide by this process (Beauchamp et al. 1984; Weil and Sandler 1997). Hydrogen sulfide can also be produced by the hydrogen reduction or acid decomposition of a sulfide (Pouliquen et al. 1989). Current U.S. manufacturers of hydrogen sulfide are given in Table 5-1.

Hydrogen sulfide is not listed in the Toxics Release Inventory (TRI) as of August, 2004.

5.2 IMPORT/EXPORT

No data on import or export volumes for hydrogen sulfide are available.

5.3 USE

Hydrogen sulfide has a variety of industrial uses. Its major use is in the production of elemental sulfur and sulfuric acid. Sulfur recovered from the treatment of sour gas in 1986 accounted for 14 million tons, or 25% of the total world sulfur production. In 1995, the production of sulfuric acid was estimated to

Table 5-1. Current U.S. Manufacturers of Hydrogen Sulfide[a]

Company	Location
ATOFINA Chemicals, Inc.	
Thio and Fine Chemical Division	Houston, Texas
Montana Sulphur and Chemical Co.	Billings, Montana

[a]Derived from Stanford Research Institute (SRI) 2003, receipt where otherwise noted. SRI reports production of chemicals produced in commercial quantities (defined as exceeding 5,000 pounds or $10,000 in value annually) by the companies listed.

consume $1.1x10^5$ metric tons of hydrogen sulfide. More recent data on the consumption of hydrogen sulfide were not found. Hydrogen sulfide is used in the manufacture of metal sulfides and thioorganic compounds. Hydrogen sulfide is also used in the purification of nickel and manganese, in catalyst activation and poisoning, and in the treatment of metallic surfaces. It is used in metallurgy and in the production of heavy water for the nuclear industry. In the past, hydrogen sulfide was used as an agricultural disinfectant (Beauchamp et al. 1984; HSDB 2004; Weil and Sandler 1997).

5.4 DISPOSAL

Hydrogen sulfide is designated as a hazardous substance under Section 311(b) of the Clean Water Act (EPA 2004c). Disposal of wastes containing hydrogen sulfide is controlled by a number of federal regulations (see Chapter 8).

The EPA-assigned hazardous waste number for hydrogen sulfide is U135 (EPA 2004e). Generators of waste exceeding 100 pounds/month containing hydrogen sulfide must conform with the EPA regulations for the storage, transportation, treatment, and disposal of waste (EPA 2004c). Additional information concerning the accidental release of hydrogen sulfide and its reporting requirements is found in Chapter 8.